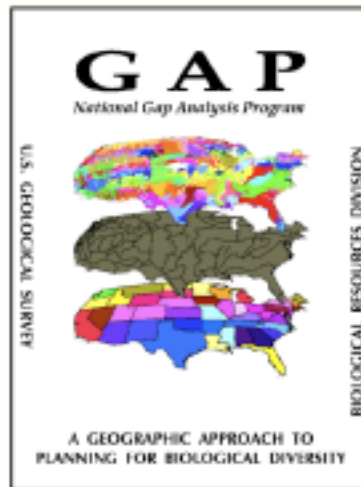# Gap Analysis Program History and Overview

"**Gap** analysis" is a scientific method for identifying the degree to which native animal species and natural plant communities are represented in our present-day network of conservation lands . . ."

GAP
National Gap Analysis Program

U.S. GEOLOGICAL SURVEY   BIOLOGICAL RESOURCES DIVISION

A GEOGRAPHIC APPROACH TO PLANNING FOR BIOLOGICAL DIVERSITY

The concept for the Gap Analysis Program (GAP) was born in 1987 in response to the need to complement species-by-species management in dealing with broad-spectrum habitat loss. The need for synoptically clear and geographically explicit information on the distribution of each native vertebrate species, natural community, and their management status was evident.

Following two years of methods development, the program was launched in 1989 as a research project exploring how to develop predictive information that can be used to manage the Nation's biological diversity ("biodiversity") so that ordinary plant and animal species will not become threatened with extinction. Over the past ten years, important new and successful methods for developing the information needed to manage the country's diversity of life forms have emerged, overcoming barriers to mapping elements to biological diversity across large areas -- something that had never before been done.

A wide range of tools and procedures have been developed, including standards for classifying natural communities, a consistent set of satellite images from which to render digital databases, and ways in which GAP information is applied to everyday resource decisions and long-range planning. Today, GAP is operational nationwide and has enjoyed substantial international interest.

GAP's mission is to promote biodiversity conservation by developing and sharing explicit information on where species and natural communities occur and how they are being managed for their long-term survival -- making it an important part of the overall National Biological Information Infrastructure (NBII). "Gap analysis" is a scientific method for identifying the degree to which native animal species and natural plant communities are represented in our present-day network of conservation lands. Those species and communities not adequately represented constitute "gaps" in conservation lands and efforts.

Mapping Natural Community and Species Distributions

The ability to successfully map natural communities and species in terrestrial as well as aquatic environments has required breakthroughs in science, technology, and effective partnering.

To develop maps of natural plant communities, satellite imagery is combined with existing data, air video, field reconnaissance, and expert knowledge to create first-ever statewide maps for use by land managers and planners. GAP partners include state agencies, universities, businesses, and private organizations. The program works to develop standards -- such as those used to classify natural vegetation communities or to predict the distribution of animal species -- that provide a framework for individual states to further develop creative techniques and tools.

"Predictive modeling" is used to map species that breed or use habitats in a given state. To predict their distributions, species are associated with mapped habitat characteristics using computerized GIS (geographic information system) tools. The resultant maps predicting species distributions are checked for accuracy against verified checklists of species occurrences. GAP began by mapping distributions of amphibian, bird, mammal, and reptile species. Recognizing that biodiversity includes all life forms, the program is currently developing methods to extend its coverage to ant, fish, mussel, crayfish, snail, and other species, and will include additional species as knowledge and resources allow.

Mapping Land Stewardship and Finding Conservation Gaps

GAP characterizes land and water management according to the steward's (resource manager's) intent to maintain biodiversity. Stewardship maps identify categories of land ownership, managing authority, and management intent as described by the stewards. The distribution of a species or a natural community is overlaid with a land

stewardship map, and the extent of an element's representation in conservation lands is determined.

Products

GAP data and reports are distributed through state data distribution centers for the cost of shipping and handling. Data are also made available on CD-ROM and through the NBII. Current products include:

- Land Cover Maps: Produced from 30-meter satellite imagery, in digital GIS format, showing dominant vegetation types (for example, "Eastern Cottonwood Floodplain Forest").

- Species Distribution Maps: Depict the predicted distribution of each vertebrate species, in digital GIS format.

- Land Stewardship Maps: Indicate categories of ownership, managing authority, and management status for biodiversity conservation, in digital GIS format.

- State Project Reports: With analyses of the conservation status for each species and natural community, in digital form with graphic versions of all GIS maps.

Partnership Opportunities

GAP state projects could not be conducted without the participation of nearly 500 cooperating state and federal agencies, academic and nonprofit institutions, tribes, and businesses. Nationwide cooperators include the Department of Defense, the Environmental Protection Agency, and The Nature Conservancy. Partnerships with GAP bring together many entities that may not have previously worked together, but should -- providing benefits to all parties.

As part of the overall NBII effort, GAP investigators are helping many organizations apply GAP data to their own missions. Hundreds of GAP applications have been made nationwide, ranging from forest management, conservation planning, and scientific research endeavors to business and industry applications. A sample of applications of GAP data can be accessed on the Gap Analysis Program Web site at <www.gapanalysis.gov>. These Web pages also provide general information on the program, a collection of GAP literature, state contacts, the status of GAP projects, and specific data availability.

For More Information

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Tiger Salamander
Ambystoma tigrinum

■ PrimaryHabitat

■ SecondaryHabitat
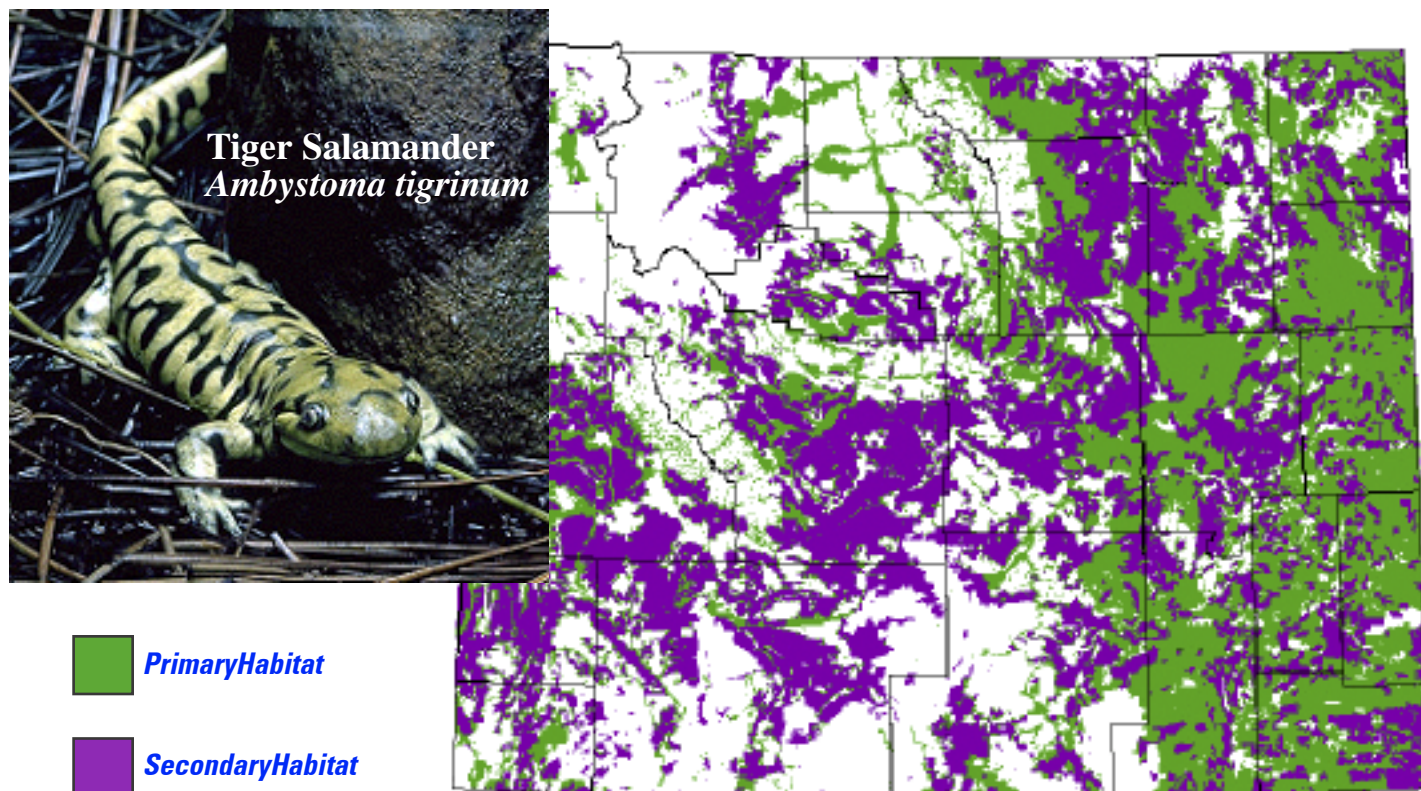
Example of Species Distribution Maps: modeled ranges of birds, mammals, reptiles, and amphibians